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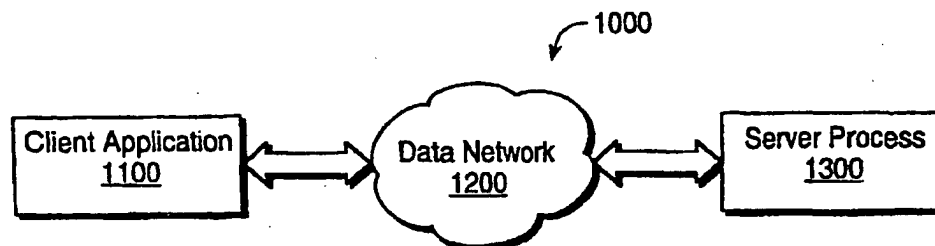
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(54) Title: METHOD, APPARATUS, AND COMPUTER PROGRAM PRODUCT FOR DEFERRED COMPLETION OF MULTI-STEP USER TRANSACTION APPLICATIONS



(57) Abstract: Disclosed are server features for allowing a client user to defer completion of multi-step user transaction applications ("MUTAs") and later resume the MUTA. One disclosed feature is providing a selectable deferral action in a page implementing part of the MUTA, e.g., HTML, XML, JavaScript/ECMA Script document. If the client user selects to defer completion, a state object is created by the server and stores state information including information previously entered during the MUTA. The server provides a resumption object to the user including a resource for resuming the deferred MUTA. When the user selects the resource, state information stored in the state object is loaded and the user may complete the remainder of the MUTA. An additionally disclosed aspect is automatic state saving where state information is stored automatically during multiple steps in the MUTA; the user then need not select deferral.

**METHOD, APPARATUS, AND COMPUTER PROGRAM PRODUCT FOR
DEFERRED COMPLETION OF MULTI-STEP USER TRANSACTION
APPLICATIONS**

FIELD

5 Aspects of the invention relate generally to server architectures for transaction processing and more particularly to architectures with features allowing user control over the timing of the completion portion of transaction processing.

BACKGROUND

10 The collection of protocols and applications commonly referred to as the World Wide Web ("Web") is a widely used client-server architecture for transaction applications. The convenience of carrying on transactions with Web applications is leading to an increasing portion of the transactions persons engage in day-to-day being performed with Web applications.

15 Typically, transaction applications involve many steps each with its own page. The network user generally must interact must with each page of the transaction application. When such a multi-step user transaction application (hereinafter "MUTA") is started by the user, they may not have expected the MUTA to require as many steps as it does, or some other activity may interrupt the user's ability to complete the MUTA at the current time. This is particularly true with increasingly popular platforms where, for instance, Web applications, are combined with televised entertainment. Such platforms are frequently known as "Enhanced TV" or "Interactive TV" (hereinafter "ITV"). In such a context, a viewer of a video program may be prompted by a Web resource enhancing the video program to initiate a transaction. However, the user may wish to return to viewing the video program quickly and not wish to spend the time to complete the transaction at that moment.

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Thus it would be desirable for a mechanism to exist that allowed the user to defer completion of such a transaction.

Related series of technologies include user registration systems. In a typical user registration system, a user provides information to the operator of, for instance, a Web application. The user may be able to pre-specify information that is relevant to a later interaction during the registration process. However, the registration information that is stored cannot provide information that would allow a user to return to the precise position in a later-initiated transaction where the user decided to defer completion. Put another way, while user data stored, for instance as part of a registration process, may be relevant to a later transaction and form part of the state of the transaction at any particular step, user registration data does not provide full state information for later-initiated transactions. Accordingly, stored registration data technologies are unable to provide a system for preserving state of a MUTA to allow deferred completion and resumption.

An additional aspect of conventional technologies is that conventional Web applications lack a convenient mechanism to defer completion at any point of a transaction. Many conventional electronic commerce applications operate on a 'shopping cart' model. In a typical 'shopping cart' model application, a user will interact with an 'electronic store' of some sort: browsing items, comparing product features, searching, etc., and then add items the user wishes to purchase to an electronic 'shopping cart'. When the user wishes to complete their interaction at the 'electronic store,' the user so indicates and the items 'in' their 'shopping cart' are processed to consummate the transaction. Many 'shopping cart' applications provide the feature that a user can return to their 'shopping cart' with the state preserved, i.e., the items they have previously 'in' their 'shopping cart' will still be there. However, the 'shopping cart' is but one part in an overall shopping application: users do not have the ability to return directly to other points in the overall process, for example a

particular page providing information about a product's features. As the type and nature of Web transactions becomes more complex, and as less sophisticated users carry on such transactions, a need has arisen for a general solution to the problem of allowing a user to defer completion of MUTAs at any step in the overall interaction and resume the interaction at that stage at a later time.

SUMMARY

In order to provide a solution to the forgoing and additional problems, aspects of our invention provide a method, apparatus, and computer program product for deferred completion of multi-step user transaction applications.

One aspect of the invention involves computer-implemented methods for deferring completion of a multi-step user transaction application. An illustrative method includes providing a page to a client application. The page includes one or more resources for input of information related to completion of the MUTA, and a resource for selection of a deferral action. The method also includes receiving an indication of the selection of the deferral action, storing state information (including a position in the MUTA and information related to completion of the MUTA); and generating a resumption object including an identifier of a resource for completion of the MUTA. Storing state information can be performed automatically at more than one step in the MUTA and storing state information can be performed in response to user selection. In addition storing state information may include monitoring an elapsed time since a transaction page was provided; determining whether the elapsed time exceeds a predetermined time limit; and storing state information if a user response is received within the predetermined time limit. In an further step, the resumption object is transmitted to a client application.

An additional variation of the illustrative method includes a computer-implemented method for completing a previously-deferred MUTA. The computer-implemented method includes providing a resumption object to a client application.

The resumption object here includes an identifier of a resource for completion of the MUTA. Additional steps in the method include receiving a request for the resource for completion of the MUTA; retrieving previously-received information for returning to a state at which the MUTA was previously deferred; and providing a resource
5 corresponding to the state at which the MUTA was previously deferred.

Yet another aspect of the present invention are computing apparatuses for deferring completion of a multi-step user transaction application. An illustrative computing apparatus with a processor, a memory, and an input/output system includes server process logic configured for providing a page to a client application, the page
10 including one or more resources for input of information related to completion of the MUTA and a resource for selection of a deferral action. The server process logic is further configured for receiving an indication of the selection of the deferral action, and generating a resumption object comprising an identifier of a resource for completion of the MUTA. The computing apparatus also includes a data storage
15 system configured for storing state information including a position in the MUTA, and information related to completion of the MUTA. In a variation, the server process logic is configured for storing state information in the data storage system at plural steps in the MUTA; and, the illustrative apparatus may include process logic configured for monitoring an elapsed time since a transaction page was provided. In
20 yet another component, the server process logic is further configured for transmitting the resumption object to a client application.

An additional variation of the illustrative apparatus includes a data storage system configured for storing a state object and server process logic configured for providing a resumption object to a client application. The resumption object includes
25 an identifier of a resource for completion of the MUTA. The server process logic is also configured to receive a request for the resource for completion of the MUTA, retrieve previously-received information from the state object for returning to a state

at which the MUTA was previously deferred, and provide a resource corresponding to the state at which the MUTA was previously deferred.

Yet another aspect of the invention are computer program products including a computer-readable storage medium having computer-readable program code embodied therein for deferring completion of a multi-step user transaction application. Illustrative computer-readable program code includes code for providing a page to a client application. The page includes one or more resources for input of information related to completion of the MUTA, and a resource for selection of a deferral action. The computer-readable program code also includes code for receiving an indication of the selection of the deferral action, code for storing state information (including a position in the MUTA and information related to completion of the MUTA), and code for generating a resumption object comprising an identifier of a resource for completion of the MUTA. The code for storing state information may also include code for storing state information at two or more steps in the MUTA. The code for storing state information may include code for monitoring an elapsed time since a transaction page was provided; code for determining whether the elapsed time exceeds a predetermined time limit; and code for storing state information if a user response is received within the predetermined time limit.

An additional variation on the illustrative program product includes a computer-readable medium having computer program code embodied therein, the computer program code including code for providing a resumption object to a client application. The resumption object includes an identifier of a resource for completion of the MUTA. The computer program also includes code for receiving a request for said resource for completion of the MUTA, code for retrieving previously-received information for returning to a state at which the MUTA was previously deferred; and code for providing a resource corresponding to said state at which the MUTA was previously deferred.

Another aspect of the invention is that it can obtain additional benefits when implemented in a transaction system that also enables automatic suppression of pages in multi-page forms-based transaction applications. An illustrative computer-controlled method enabling reduction of the number of pages provided for user input in forms-based user transaction applications includes examining a set of form fields associated with information required to complete a user transaction application for determining if sufficient form field values corresponding to the set of form fields are available to complete the user transaction application. If at least one of the form field values corresponding to the set of form fields is unavailable, a page is provided for receiving the at least one of the set of form field values; otherwise a request to a successor page is provided for further processing of the user transaction application. In a variation, this illustrative method includes providing a selectable option for determining whether the user transaction application should have the number of pages for user input reduced and, wherein reducing the number of pages provided for user input in forms-based user transaction applications occurs only if the selectable option is selected.

In another variation of this illustrative method, the set of form fields is divided among a plurality of ordered pages; and the step of providing a request to a successor page includes redirecting a request to the successor page. Still further, providing a page for receiving the at least one of the set of form field values may include: repetitively adding at least one of the form fields corresponding to the at least one of the set of form field values to a developing page; and providing the developing page for receiving the at least one of the set of form field values. In an additional variation, adding at least one of the form fields may include determining if adding at least one of the form fields would result in the developing page, when rendered by a client application, to exceed predetermined limits, and; if not, adding the at least one of the form fields to the developing page. A two-dimensional bin-packing algorithm could be used to arrange form fields on the developing page and determine whether adding a form field would exceed the predetermined limit. The predetermined limit may be

based, for instance, on the screen size (in pixels) of a television. The size of form fields can also be denominated in pixels and used by the bin-packing algorithm.

Additionally, computing apparatus for deferring completion of a multi-step user transaction application can be further configured with programmed instructions for reducing the number of pages provided for user input in forms-based user transaction applications. Such programmed instructions configure the computing apparatus to provide structures for implementing particular functions in accordance with some embodiments of the invention. In an illustrative computing apparatus also enabling reducing the number of pages provided for user input in forms-based user transaction applications, the programmed instructions configure the computing apparatus to provide structures for: examining a set of form fields associated with information required to complete a user transaction application; determining if sufficient form field values corresponding to the set of form fields are available to complete the user transaction application; and providing a page for receiving the at least one of the set of form field values if at least one of the form field values corresponding to the set of form fields is unavailable and otherwise providing a request to a successor page for further processing of the user transaction application. In a variation, the illustrative method includes providing a selectable option for determining whether said user transaction application should have the number of pages for user input reduced and, wherein reducing the number of pages provided for user input in forms-based user transaction applications occurs only if the selectable option is selected. In a variation the set of form fields is divided among a plurality of ordered pages; and providing a request to a successor page includes redirecting a request to the successor page. In addition, providing a page for receiving the at least one of the set of form field values may include repetitively adding at least one of the form fields corresponding to the at least one of the set of form field values to a developing page; and providing the developing page for receiving the at least one of the set of form field values. In a variation, adding at least one of the form fields may include determining if adding at least one of the form fields would result in the

developing page, when rendered by a client application, to exceed predetermined limits, and if not, adding the at least one of the form fields to the developing page.

5 A computer readable storage media having computer readable code embodied therein for for deferring completion of a MUTA can further include code for reducing the number of pages provided for user input in forms-based user transaction applications. An illustrative storage medium for reducing the number of pages provided for user input in forms-based user transaction applications further includes code for examining a set of form fields associated with information required to complete a user transaction application; code for determining if sufficient form field
10 values corresponding to the set of form fields are available to complete the user transaction application; and code for providing a page for receiving the at least one of the set of form field values if at least one of the form field values corresponding to the set of form fields is unavailable. Otherwise, a request to a successor page is provided for further processing of the user transaction application. In another aspect, the code
15 providing a page for receiving the at least one of the set of form field values may include: code for repetitively adding at least one of the form fields corresponding to the at least one of the set of form field values to a developing page; and code for providing the developing page for receiving the at least one of the set of form field values. Also, adding at least one of the form fields may include determining if adding
20 at least one of the form fields would result in the developing page, when rendered by a client application, to exceed predetermined limits, and if not, adding the at least one of the form fields to the developing page. In another variation the set of form fields is divided among a plurality of ordered pages; and providing a request to a successor page comprises redirecting a request to the successor page.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

- 5 Fig. 1 is a diagram of elements in an operating environment in which an illustrative embodiment can be employed;
- Fig. 2 depicts a computer system capable of being configured to embody aspects of the invention in accordance with an illustrative embodiment;
- 10 Fig. 3 is a state diagram showing deferred completion of a MUTA in accordance with an illustrative embodiment;
- Fig. 4 is a diagram of a completion deferral data architecture in accordance with an illustrative embodiment;
- Fig. 5 depicts a rendered screen display of a step in an illustrative MUTA ;
- 15 Fig. 6 depicts a flow diagram of a method for deferring completion of a MUTA in accordance with an illustrative embodiment;
- Fig. 7 depicts a flow diagram of a method for deferring completion of a MUTA with automatic state saving in accordance with an illustrative embodiment; and
- 20 Fig. 8 depicts a flow diagram of a method for completing a previously-deferred MUTA in accordance with an illustrative embodiment.

DETAILED DESCRIPTION

DESCRIPTION OF FIGURES

Fig. 1 depicts elements in an operating environment 1000 in accordance with an illustrative embodiment. Shown are a client application 1100 and a server process 1300. The client application 1100 and the server process 1300 are configured for client-server communication across a data network 1200. In some embodiments, the data network 1200 comprises a portion of the Internet, although other networks could be used, either public or private, and using either the TCP/IP protocols (including the User Datagram Protocol) or with other protocols. In preferred embodiments the Hypertext Transfer Protocol ("HTTP") is used to communicate Request and Response messages and Hypertext Markup Language ("HTML") pages.

In some embodiments, the client application 1100 executes on a hardware platform that integrates the features of a television receiver and network connectivity. Many commercially available structures can perform these functions. Certain of the current generation of "set-top boxes" are suitable, including, for instance, the WebTV "Plus" set-top box (also known as an Internet Receiver available through Microsoft's WebTV Networks, Inc. of Palo Alto, California (and their manufacturing licensees). In other embodiments, the client application could execute on a general purpose computer configured with suitable video hardware to integrate the features of a television receiver and network connectivity. As one skilled in the art will appreciate from this disclosure, the features of the invention are not limited to embodiments which operate with client platforms that integrate television and network connectivity. However, the features of the invention obtain particular benefits in this context.

Fig. 2 depicts a computer system 2000 capable of embodying aspects of the invention. The server process 1300 may execute on structures in accordance with the computer system 2000. The computer system 2000 comprises a microprocessor 2010, a memory 2020 and an input/output system 2030. The memory 2020 is capable of

being configured to provide a data structure 2040 which may contain data manipulated by the computer system 2000 when embodying aspects of the invention. Further illustrated is a media drive 2070, such as a disk drive, CD-ROM drive, or the like. The media drive 2070 may operate with a computer-usable storage medium 5 2075 capable of storing computer-readable program code ("code") able to configure the computer system 2000 to embody aspects of the invention. The input/output system 2030 may also operate with a keyboard 2050, a display 2060, a pointing device 2090, or a network such as the data network 1200. The input/output system 2030 may also communicate with a mass data storage 2080 such as a database or the 10 like. The mass data storage 2080 may store information related to users of the client application 1100 that facilitate completion of MUTA, including, for instance, user profile information, records of past interactions, payment instrument information, demographic information, product or service feature preference information, or the like.

15 As illustrated, the computer system 2000 is general-purpose computing machinery. As one of skill recognizes, programmed instructions may configure general purpose computing machinery to embody structures capable of performing functions in accordance with aspects of the invention. Special purpose computing machinery comprising, for example, an application specific integrated circuit (ASIC) 20 may also be used. In addition, the computer system 2000 could be diskless and operate with a non-volatile memory. Further, configurable hardware could be used including, for instance, a field programmable gate array, or a complex programmable logic device. One skilled in the art will recognize, numerous structures of programmed or programmable logic capable of being configured to embody aspects of 25 the invention. In some embodiments, the computer system 2000 is a SPARC-based workstation from Sun Microsystems of Mountain View, CA, running the SOLARIS operating system and the Apache HTTP server with a Secure Sockets Layer module. In such embodiments, the server process 1300 could comprise the Apache HTTP server with the Secure Sockets Layer module.

The client application 1100 (under the direction of a user) may communicate with the server process 1300 to carry out a MUTA. The user transaction application may be a commercial transaction (sometimes referred to as "E-Commerce"), although one skilled in the art is familiar with many other user transaction applications
5 conventionally practiced in, for instance the Internet environment.

Typically MUTAs involve many steps, each with its own page(s). The user may not have expected so many steps when initiating the MUTA, or some other activity may interrupt the user's ability to complete the application at the current time. This is particularly true of ITV combinations of World Wide Web applications and
10 televised entertainment where the user may wish to return to watching television full-screen before the interactive aspects of the application are completed.

Fig. 3 depicts a deferred completion state diagram 3000 illustrative of various embodiments of the invention. The deferred completion state diagram 3000 is a high level representation of the context in which features of the invention may be
15 advantageously employed. As depicted in Fig. 3, states and transitions of a MUTA are shown. When a user initiates the MUTA a first state 3100 is entered. The first state 3100 may be understood on differing levels of generality, from the first page provided from the server process 1300 to the client application 1100, to greater levels of generality including parameters relevant to the MUTA and/or their values. Without
20 deferral, the MUTA proceeds through a first to second state transition 3800 to a second state 3200, through a second to third state transition 3850 to a third state 3300, etc. until a last or Nth state 3400 is entered and the MUTA completes. For similar transactions, one ordinarily expects the number of pages of forms in a transaction to be greater when the client platform is an enhanced or interactive television device than
25 when the client platform is a conventional PC-based browser. The number of states at which a transaction could be deferred would typically grow along with the number of pages of forms in the transaction.

Fig. 3 also depicts a deferred state 3500 entered through a deferral transition 3600. For instance, if the second state 3200 were the second page of the MUTA, the user could elect to defer completion of the MUTA and transition from the second state 3200 to the deferred state 3500 with the deferral transition 3600. Once deferred, the MUTA remains in the deferred state 3500 until the user decides to complete it. When the user decided to complete it, a resumption transition into the second state 3720 would return the MUTA to the second state 3200--the position from which the user entered the deferred state 3500. Fig. 3 illustrates this with a parenthetical notation of the resumption transition given the position at deferral, e.g. (R|P=2) for "Resume given that position at deferral was state 2". The user could then proceed to complete the MUTA from the second state 3200. Fig. 3 also shows a resumption transition into the third state 3730 and a resumption transition into the Nth state 3740 indicating that the features of the invention provide for deferral and resumption from any state of the MUTA.

Fig. 4 depicts an data architecture 4000 in accordance with an illustrative embodiment. In this illustrative embodiment, the server process 1300 configures the memory 2020 of the computer system 2000 to provide the data structure 2040 in accordance with the data architecture 4000 for deferral and resumption of MUTAs. In other embodiments, information stored in the data architecture 4000 could be stored in the mass data storage 2080 and maintained with a conventional database management system. The data architecture 4000 comprises, for instance a table or tree, keyed by a user identifier 4100. The user identifier 4100 could be an identifier of a user associated generally with an account maintained by an operator of the server process 1300, could be established on a per-transaction basis, could be a more general form of personal identification information such as a PIN number, or other identifier. Fig. 4 also depicts a first transaction state object 4200 comprising a transaction identifier 4210, a position identifier 4220, and a set of field/value pairs 4230. State objects such as the first transaction state object 4200 are created in accordance with the illustrative embodiment when deferred completion of the MUTA is elected by the user.

The transaction identifier 4210 is an identifier of a particular transaction for which deferred completion has been elected. A user may defer completion of plural transactions, as illustrated by a second transaction state object 4300 and a Nth transaction state object 4400. The transaction identifier 4210 in the first transaction state object 4200 distinguishes the transaction associated with the first transaction state object 4200 from those associated with the second transaction state object 4300 or the Nth transaction state object 4400.

The position identifier 4220 in the first transaction state object 4200 identifies a position in the flow of steps the MUTA comprises to which the user should be returned when resuming the MUTA. The position could be the position at which the user elected deferred completion; the position could also be context-sensitive and, for instance, return the user to a contextually-appropriate prior step. When, for instance, the MUTA is implemented through one or more text markup language documents, e.g. HTML pages, the first transaction state object 4200 may conveniently be a URI.

The set of field/value pairs 4230 in the first transaction state object 4200 stores data fields and associated data field values relevant to completion of the MUTA that have been made available up to the point at which completion deferral was elected. This may include, for instance, user data input as part of the MUTA, data from the user from previous transactions, data obtained from other sources, e.g., user profile information, accounting information internal to the operator of the server process 1300, etc.

In some embodiments, the MUTA is implemented as a plurality of text markup language documents, possibly including dynamic contents through server-side scripts or programs, and/or client-side scripts or programs. One illustrative embodiment implements the MUTA as a plurality of JavaServer Pages which dynamically produce HTML-based or JavaScript/ECMAScript-based forms for rendering by the client application 1100.

Fig. 5 depicts a rendered screen display of a step in the MUTA in accordance with this illustrative embodiment. The HTML or JavaScript/ECMAScript forms provide resources for the input of information related to completion of the MUTA. The forms may be rendered by the client application 1100 as illustrated by a first form field 5100, a second form field 5200, and a third form field 5300 in **Fig. 5**. In addition, a resource for selection of a deferral action is shown by a 'defer' button 5400. The resource for selection of a deferral action may also be implemented in HTML, a scripting language, or using other Internet programming techniques known in the art. The particular manner of implementation is not fundamental.

Again making reference, to **Fig. 3**, the MUTA can be considered to be in, for instance the second state 3200, when the rendered display of **Fig. 5** is being presented to the user. If the user were to select the deferral action by using a selection device to select the 'defer' button 5400, the deferral transition 3600 would be followed to enter the deferred state 3500.

To further illustrate features of deferred completion of MUTAs, reference can be made to **Fig. 6** where a flow diagram of a 'deferred completion' method 6000 in accordance with an illustrative embodiment is shown. The 'deferred completion' method 6000 may be carried out by the server process 1300 when engaging in client server communications with the client application 1100. As depicted in **Fig. 6**, the 'deferred completion' method 6000 is shown initiating at an intermediate point in a MUTA. As one of skill in the art will appreciate, the particular steps which come before the 'deferred completion' method 6000 in the MUTA are not fundamental and the completion deferral features illustrated by the 'deferred completion' method 6000 could be added to conventional transacting systems.

Process flow initiates at a 'start' terminal 6100 and continues to a 'generate next transaction page' process 6200. The 'generate next transaction page' process 6200 involves the server process 1300 creating the next in a series of pages

implementing the information flow of the MUTA. This may occur in any conventional manner. In preferred versions of the invention, a server-side programming architecture, such as JavaServer Pages, is used and pages with application logic interact with the server process 1300 to create the contents of the next page dynamically.

Process flow continues to a 'provide next transaction page' process 6300 in which the server process 1300 transmits the next page from the 'generate next transaction page' process 6200 to the client application 1100. The client application 1100 parses and renders the next page and awaits user interaction. As noted in connection with Fig. 5, the user may enter data in form fields or interact with information interchange aspects of the MUTA. In addition, the user may elect deferred completion of the MUTA. The user then responds to the next page; the server process 1300 receives a 'user response' data block 6350, and process flow continues to a 'deferral' decision process 6400.

The 'deferral' decision process 6400 examines the 'user response' data block 6350 to determine if the user has elected deferred completion. If so, process flow continues to an 'state object setup' process 6500 which creates a state object similar to, for instance the first transaction state object 4200. The 'state object setup' process 6500 then stores in the state object a transaction identifier, data fields and values necessary for completion of the MUTA, and an identifier of the current position in the MUTA. The data fields and values stored in the state object preferably comprise all data fields and values necessary to complete the MUTA that have been entered by the user up to this point. In addition if sufficient values for data fields that are necessary to complete the MUTA are available without user input, for instance from a record of a previous interaction, these data fields and values are also stored in the state object.

Process flow continues to a 'provide resumption object' process 6600 that creates and provides to the user an object that will allow the user to resume the

MUTA they have deferred. In some embodiments, the resumption object is a URI that identifies a resumption resource. When a request is made to the resumption resource, the data fields and values stored in the state object would be retrieved and the request is redirected to the position stored in the state object. One skilled in the art will appreciate many other similar implementations where the redirection is to a URI functionally equivalent as to the position stored in the state object. In some embodiments, the URI that identifies the resumption resource could be emailed to the user.

In other embodiments, the resumption resource is the resource referenced by the position stored in the state object. In these embodiments, the resumption object could then be the resumption resource. The resumption object could be provided to the user through email or other messaging system.

In still other embodiments, the server process 1300 could be configured to provide a page showing a list of the transactions the user has deferred and a resumption resource for each of the list of transactions. The resumption object could be a URI that is emailed to the user that would provide the page when the user's client application requested the URI. In a variation, the server process could generate the page and the page could be emailed to the user.

Numerous other variations will be apparent to one skilled in the art that are within the scope and spirit of the invention. From the 'provide resumption object' process 6600, process flow completes through an 'end' terminal 6800

If the user does not elect to defer completion, the 'deferral' decision process 6400 exits through its 'no' branch and process flow continues to a 'complete' decision process 6700 that determines if steps remain in the MUTA. If so, the 'complete' decision process 6700 exits through its 'yes' branch and process flow returns to the 'generate next transaction page' process 6200 for another iteration.

When no steps remain in the MUTA, the 'complete' decision process 6700 exits through its 'yes' branch and process flow completes through the 'end' terminal 6800.

As described with reference to Fig. 5 and Fig. 6, when the user selects to defer completion through a selectable deferral action resource, for instance the 'defer' button 5400, a state object was created to store the state of the MUTA so the user could later complete it. In other variations, a state object is maintained throughout the MUTA so that that user need not affirmatively elect to defer completion. Rather, if the user simply fails to complete the MUTA for any reason, it may be completed by resuming at a later time.

Fig. 7 depicts a flow diagram of a 'deferred completion with automatic state saving' method 7000 in accordance with an illustrative embodiment. In Fig. 7 initial steps of a MUTA (which were omitted in Fig. 6) are shown. Process flow initiates at a 'start' terminal 7100 and continues when the server process 1300 receives an 'initiating request' data block 7200 from the client application 1100 of a user. The 'initiating request' data block 7200 in preferred embodiments is an HTTP Request Message for a resource which initiates a MUTA.

Process flow continues to a 'state object setup' process 7300 that creates a state object such as the first transaction state object 4200 and sets a transaction identifier, a position identifier, and any data field/value pairs that may be available. Processing continues to a 'generate next transaction page' process 7400 and a 'provide next transaction page' process 7500 that executes analogously to the corresponding processes described in connection with Fig. 6.

Next, a timeout timer 7600 executing on the server process 1300 awaits a response from the client application 1100. If no response arrives within a predetermined time period, the timeout timer 7600 exits through its 'automatic deferral' branch and process flow continues to a 'provide resumption object' process

7850 that executes analogously to the corresponding processes described in connection with Fig. 6. Process flow then completes through an 'end' terminal 7950. In some embodiments, the timeout timer 7600 (or other process) could also be configured to insure that the user's state is saved should an exceptional event force
5 interruption of the MUTA session. For instance, should the server process 1300 crash or otherwise fail in a manner forcing interruption of the session with the client application 1100, rather than simply exit, the state of the MUTA could then be saved enabling the user to resume from that point.

If a response is received from the client application 1100 within the
10 predetermined time period, the timeout timer 7600 exits through its 'timely response' branch and data from a 'user response' data block 7700 is processed. Next a 'state object update' process 7800 updates the state object created by the 'state object setup' process 7300: the position identifier is altered to reflect that the MUTA has advanced a step, and data received in the 'user response' data block 7700 is added to the data
15 fields/values. Process flow continues to a 'complete' decision process 7900 that executes analogously to the corresponding processes described in connection with Fig. 6 and process flow either returns to the 'generate next transaction page' process 7400 for another iteration or completes through the 'end' terminal 7950.

A user should be able to resume a previously deferred MUTA to complete it.
20 Fig. 8 depicts a flow diagram of a 'MUTA resumption' method 8000 in accordance with an illustrative embodiment. The 'MUTA resumption' method 8000 is carried out by the server process 1300. Process flow initiates at a 'start' terminal 8100 and continues to receive a 'resumption URI request' data block 8200 from the client application 1100 of the user.

25 As described with reference to the 'provide resumption object' process 6600, the user is provided an identifier of a resumption resource in a resumption object. In this illustrative embodiment, the resumption object comprises a resumption resource

in the form of a URI in the 'resumption URI request' data block 8200. In preferred embodiments the 'resumption URI request' data block 8200 is an HTTP Request Message and the server process 1300 parses the Request Message; extracts the resumption URI; and maps the resumption URI to an internal resource used to access
5 the state object associated with the MUTA. For instance, the mapping may be to a table lookup operation or database query depending, for instance, on the storage architecture for state objects.

Process flow continues to a 'retrieve position' process 8300 and a 'retrieve fields/values' process 8400. In the 'retrieve position' process 8300, the server process
10 1300 accesses the state object and retrieves the position identifier from the state object. Similarly, in the 'retrieve fields/values' process 8400, the server process 1300 retrieves the data field/value pairs from the state object.

During the period between when a MUTA is deferred and when it is resumed, additional information required to complete the MUTA may have been entered by the
15 user or otherwise made available to the server process 1300. The additional information could be stored in a user profile. When the user resumes the MUTA after deferral, a 'merge profile information' process 8500 examines the user profile to determine what information in the user profile could be used in completion of the remainder of the user transaction application.

20 Process flow continues to a 'redirect to position' process 8700 process where the server process 1300 redirects the Request Message from the 'resumption URI request' data block 8200 to the position identifier retrieved from the state object by the 'retrieve position' process 8300. Next, a 'transaction completion' process 8800 allows the user to complete the MUTA. The 'transaction completion' process 8800 may, for
25 instance, be to return to processing such as that described above in connection with Fig. 6. Process flow completes through a 'end' terminal 8900.

Additional disclosure may be found in the pages identified as Appendix A which form a portion of this Specification.

5 Although the present invention has been described in terms of features illustrative embodiments, one skilled in the art will understand that various modifications and alterations may be made without departing from the scope of the invention. Accordingly, the scope of the invention is not to be limited to the particular embodiments discussed herein, but should be defined only by the allowed claims and equivalents thereof.

APPENDIX A**METHOD, APPARATUS, AND COMPUTER PROGRAM PRODUCT FOR
AUTOMATIC PAGE SUPPRESSION IN FORMS****FIELD**

- 5 The invention relates generally systems for on-line transactions and, more particularly, to transaction architectures in client server communications employing markup language based electronic forms for processing transaction related information.

BACKGROUND

- 10 Client-server applications employing markup language based electronic documents, e.g. the World Wide Web, often involve forms (also referred to herein as "forms pages"). Electronic commerce applications are particularly reliant on forms for receiving information from a party to a transaction that information which is necessary to complete the transaction. Especially as these applications are made
15 available to devices with limited resolutions (compared to the displays commonly used with conventional personal computers or workstations) these forms are spanning multiple pages. This trend towards the proliferation of forms pages has at least two undesirable effects.

- A first undesirable effect is that a succession of pages can become tedious and
20 frustrating to the user. Users are frequently drawn to, for instance World Wide Web applications, because of their increased convenience over conventional methods of transacting. A tedious succession of forms pages to complete a transaction negates at least a portion of the user benefits to transacting in this way. "Impulse transactions" are desirable from a consumer perspective, as they allow the consumer to immediately
25 (or more nearly so) obtain and enjoy items they wish to consume and the tedious

APPENDIX A (continued)

succession of forms pages may prevent "impulse transactions." Accordingly, it would be desirable for a system to exist that allowed for the reduction or elimination of the number of forms pages required for a user to complete a forms-based transaction application.

5 A second undesirable effect is that multiple forms pages involve multiple requests for resources of the server, thereby increasing server overhead. For instance, an operator of an electronic marketplace may have an appreciable amount of overhead costs devoted to hardware for adequate transaction processing abilities to serve customers promptly. If each transaction requires processing multiple forms pages, as
10 the number of forms pages increases, the operator needs to invest in additional computing hardware to maintain the same level of prompt customer service. Thus it would be advantageous for means to exist by which server operators processing forms-based transactions could reduce the number of forms pages required to complete a transaction.

15 Increasingly, user transaction applications cultivate repeat usage through a user registration process or by storing for later use the information provided by users in previous transaction sessions. In either instance, a server process carrying on a user transaction application may have available to it sufficient information to complete, at least some, of the form fields that are required to complete the user transaction
20 application. Further, a repeat user may desire that the server process use the available sufficient information without confirmation to complete the user transaction application. In particular, for forms pages that contain only fields for which sufficient form field values are already available, given the user's consent it may be desirable to suppress providing those forms pages to the user.

25 One conventional approach directed towards streamlining user transaction applications are conventional "one-click" or "single step" ordering systems used in electronic commerce transactions. An exemplary system is described in WO9913424,

APPENDIX A (continued)

entitled "Method and System for Placing a Purchase Order Via A Communications Network" for applicant Amazon.com. Single-step ordering systems do streamline product purchase transactions, however they do not provide a solution for automatic page suppression in forms. Typically "single-step" systems involve a pre-registration process in which a user enters the information necessary to complete transactions (generally spanning multiple forms pages) with the system. Then, when a subsequent transaction is initiated, either the entire series of transaction pages is skipped or the entire series of transaction pages must have their form field values re-entered by the user. That is, conventional systems provide no logic with respect to which aspects of a series of forms pages can be suppressed.

Conventional systems present significant disadvantages if the user is engaged in activity in addition to completing the user transaction application. For instance, when a user's client application is a device that integrates television reception with, for instance HTTP client capability, the user may initiate a user transaction application in response to an interactive portion of a video program. In this context, the user could naturally desire to complete the user transaction application with dispatch so that they can return to viewing the video program. Conventional single-step systems would be inadequate solutions in this context. This is due, in part, to the fact that they typically require the user to process the entire series of forms pages to complete input of only a few form fields, when sufficient form field values are unavailable for the few form fields. Accordingly, there is a need for a system of automatic page suppression in forms that is flexible and optimized to suppress as much of a series of forms pages as can be suppressed with user consent.

SUMMARY

In order to provide a solution to the forgoing and additional problems, aspects the present invention provide a method, apparatus, and system for automatic page suppression in forms.

APPENDIX A (continued)

One aspect of the invention involve methods for reducing the number of pages provided for user input in forms-based user transaction applications. An illustrative method includes examining a set of form fields associated with information required to complete a user transaction application for determining if sufficient form field
5 values corresponding to the set of form fields are available to complete the user transaction application; and if at least one of the form field values corresponding to the set of form fields is unavailable, providing a page for receiving the at least one of the set of form field values; and otherwise providing a request to a successor page for further processing of the user transaction application.

10 In a variation, the illustrative method includes providing a selectable option for determining whether the user transaction application should have the number of pages for user input reduced and, wherein reducing the number of pages provided for user input in forms-based user transaction applications occurs only if the selectable option is selected.

15 In another variation, the set of form fields is divided among a plurality of ordered pages; and the step of providing a request to a successor page comprises redirecting a request to the successor page. Still further, providing a page for receiving the at least one of the set of form field values may include: repetitively
20 adding at least one of the form fields corresponding to the at least one of the set of form field values to a developing page; and providing the developing page for receiving the at least one of the set of form field values. In an additional variation, adding at least one of the form fields may include determining if adding at least one of the form fields would result in the developing page, when rendered by a client
25 application, to exceed predetermined limits, and; if not, adding the at least one of the form fields to the developing page.

Yet another aspect of the invention is a computing apparatus configured with programmed instructions for reducing the number of pages provided for user input in

APPENDIX A (continued)

forms-based user transaction applications. The programmed instructions configure the computing apparatus to provide structures for implementing particular functions in accordance with some embodiments of the invention. In an illustrative computing apparatus, the programmed instructions configure the computing apparatus to provide
5 structures for: examining a set of form fields associated with information required to complete a user transaction application; determining if sufficient form field values corresponding to the set of form fields are available to complete the user transaction application; and providing a page for receiving the at least one of the set of form field values if at least one of the form field values corresponding to the set of form fields is
10 unavailable and, otherwise providing a request to a successor page for further processing of the user transaction application.

A variation includes providing a selectable option for determining whether the user transaction application should have the number of pages for user input reduced and, wherein reducing the number of pages provided for user input in forms-based
15 user transaction applications occurs only if the selectable option is selected.

In a variation the set of form fields is divided among a plurality of ordered pages; and providing a request to a successor page includes redirecting a request to the successor page. In addition, providing a page for receiving the at least one of the set of form field values may include repetitively adding at least one of the form fields
20 corresponding to the at least one of the set of form field values to a developing page; and providing the developing page for receiving the at least one of the set of form field values.

In another variation, adding at least one of the form fields may include determining if adding at least one of the form fields would result in the developing
25 page, when rendered by a client application, to exceed predetermined limits, and if not, adding the at least one of the form fields to the developing page.

APPENDIX A (continued)

Yet another aspect of the invention is a computer program product comprising a computer readable storage medium having computer readable code embodied therein for reducing the number of pages provided for user input in forms-based user transaction applications. The computer readable code includes code for examining a
5 set of form fields associated with information required to complete a user transaction application; code for determining if sufficient form field values corresponding to the set of form fields are available to complete the user transaction application; and code for providing a page for receiving the at least one of the set of form field values if at least one of the form field values corresponding to the set of form fields is unavailable
10 and otherwise providing a request to a successor page for further processing of the user transaction application.

In another aspect, the code providing a page for receiving the at least one of the set of form field values may include: code for repetitively adding at least one of the form fields corresponding to the at least one of the set of form field values to a
15 developing page; and code for providing the developing page for receiving the at least one of the set of form field values. Also, adding at least one of the form fields may include determining if adding at least one of the form fields would result in the developing page, when rendered by a client application, to exceed predetermined limits, and if not, adding the at least one of the form fields to the developing page. In
20 another variation the set of form fields is divided among a plurality of ordered pages; and providing a request to a successor page comprises redirecting a request to the successor page.

Another aspect of the invention is that it can obtain additional benefits when implemented in a transaction system that also enables deferring completion of a multi-
25 step user transaction application. Illustratively, computer-implemented methods enabling this feature include providing a page to a client application. The page includes one or more resources for input of information related to completion of the multi-step user transaction application ("MUTA"), and a resource for selection of a

APPENDIX A (continued)

deferral action. This method also includes receiving an indication of the selection of the deferral action, storing state information (including a position in the MUTA and information related to completion of the MUTA); and generating a resumption object including an identifier of a resource for completion of the MUTA.

- 5 The state information could be stored in a conventional data structure. Storing state information can be performed automatically at more than one step in the MUTA and storing state information can be performed in response to user selection. In addition storing state information may include monitoring an elapsed time since a transaction page was provided; determining whether the elapsed time exceeds a
10 predetermined time limit; and storing state information if a user response is received within the predetermined time limit. In an further step, the resumption object is transmitted to a client application. In some instances, the resumption object includes a URL or other resource reference.

- An additional feature of this illustrative method enabling deferred completion
15 includes a computer-implemented method for completing a previously-deferred MUTA. This method includes providing a resumption object to a client application. The resumption object here includes an identifier of a resource for completion of the MUTA. Additional steps in the method include receiving a request for the resource for completion of the MUTA; retrieving previously-received information for returning
20 to a state at which the MUTA was previously deferred; and providing a resource corresponding to the state at which the MUTA was previously deferred.

- A computing apparatus configured with programmed instructions for reducing the number of pages provided for user input in forms-based user transaction applications can further be configured for enabling deferred completion of MUTAs.
25 An illustrative computing apparatus also includes server process logic configured with programmed instructions for providing a page to a client application, the page including one or more resources for input of information related to completion of the

APPENDIX A (continued)

MUTA and a resource for selection of a deferral action. The apparatus is further configured for receiving an indication of the selection of the deferral action, and for generating a resumption object. The resumption object includes an identifier of a resource for completion of the MUTA. The computing apparatus also includes a data storage system configured for storing state information including a position in the MUTA, and information related to completion of the MUTA. In a variation, the apparatus is configured for storing state information in the data storage system at plural steps in the MUTA; and, the illustrative apparatus may include timing process logic configured for monitoring an elapsed time since a transaction page was provided. In yet another component, the apparatus is further configured for transmitting the resumption object to a client application.

An additional variation of the illustrative apparatus described above includes a data storage system configured for storing a state object and server process logic configured for providing a resumption object to a client application. The resumption object includes an identifier of a resource for completion of the MUTA. The server process logic is also configured to receive a request for the resource for completion of the MUTA, retrieve previously-received information from the state object for returning to a state at which the MUTA was previously deferred, and provide a resource corresponding to the state at which the MUTA was previously deferred.

Computer readable storage media having computer readable code embodied therein for reducing the number of pages provided for user input in forms-based user transaction applications can further include code for deferring completion of a MUTA. Illustrative computer-readable program code for deferring completion of a MUTA includes code for providing a page to a client application. The page includes one or more resources for input of information related to completion of the MUTA, and a resource for selection of a deferral action. The computer-readable program code also includes code for receiving an indication of the selection of the deferral action, code for storing state information (including a position in the MUTA and information

APPENDIX A (continued)

related to completion of the MUTA), and code for generating a resumption object comprising an identifier of a resource for completion of the MUTA. The code for storing state information may also include code for storing state information and two or more steps in the MUTA. The code for storing state information may include code
5 for monitoring an elapsed time since a transaction page was provided; code for determining whether the elapsed time exceeds a predetermined time limit; and code for storing state information if a user response is received within the predetermined time limit.

An additional variation on the illustrative computer program product involves
10 the computer program code including code for providing a resumption object to a client application. The resumption object includes an identifier of a resource for completion of the MUTA. The computer program product also includes code for receiving a request for said resource for completion of the MUTA, code for retrieving previously-received information for returning to a state at which the MUTA was
15 previously deferred; and code for providing a resource corresponding to said state at which the MUTA was previously deferred.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims,
20 and accompanying drawings where:

Fig. A1 is a diagram of elements in an operating environment in which an illustrative embodiment can be employed;

Fig. A2 depicts a computer system capable of being configured to embody aspects of the invention in accordance with an illustrative
25 embodiment;

APPENDIX A (continued)

Fig. A3 is a diagram of a conventional user transaction application using form pages;

Fig. A4 depicts a flow diagram of a method for automatic page suppression in forms in accordance with an illustrative embodiment; and

5 Fig. A5 depicts a flow diagram of a method for automatic page suppression in forms with just in time pagination.

DETAILED DESCRIPTION***DESCRIPTION OF FIGURES***

10 Fig. A1 depicts elements in an operating environment 1000 in accordance with an illustrative embodiment. A client application 1100 and a sever process 1300 are shown. The client application 1100 and the sever process 1300 are configured for client-server communication across a data network 1200. In some embodiments, the data network 1200 comprises a portion of the Internet, although other networks could be used, either public or private, using either the TCP/IP protocols (including the User
15 Datagram Protocol) or with other protocols. In preferred embodiments the Hypertext Transfer Protocol ("HTTP") is used to communicate Request and Response messages and Hypertext Markup Language ("HTML") pages. Other embodiments could use the Extensible Markup Language ("XML") or other markup language.

20 In some embodiments, the client application 1100 executes on a hardware platform that integrates the features of a television receiver and an HTTP client. Many commercially available structures can perform these functions. Certain of the current generation of "set-top boxes" are suitable, including, for instance, the WebTV "Plus" set-top box (also referred to as an Internet Receiver) available through Microsoft's WebTV Networks, Inc. of Palo Alto, California (and its manufacturing
25 licensees). In other embodiments, the client application could execute on a general

APPENDIX A (continued)

purpose computer configured with suitable video hardware to integrate the features of a television receiver and a client application. As one skilled in the art will appreciate from this disclosure, the features of the invention are not limited to embodiments which operate with client platforms that integrate television and network connectivity.

5 However, the features of the invention obtain particular benefits in this context.

Fig. A2 depicts a computer system 2000 capable of embodying aspects of the invention. The sever process 1300 may execute on structures in accordance with the computer system 2000. The computer system 2000 comprises a microprocessor 2010, a memory 2020 and an input/output system 2030. The memory 2020 is capable of

10 being configured to provide a data structure 2040 which may contain data manipulated by the computer system 2000 when embodying aspects of the invention. Further illustrated is a media drive 2070, such as a disk drive, CD-ROM drive, or the like. The media drive 2070 may operate with a computer-usable storage medium 2075 capable of storing computer-readable program code able to configure the

15 computer system 2000 to embody aspects of the invention. In other embodiments, the computer system 2000 could be a diskless computer with a non-volatile memory. The input/output system 2030 may also operate with a keyboard 2050, a display 2060, a pointing device 2090, or a network such as the data network 1200. The input/output system 2030 may also communicate with a mass data storage 2080 such as a database

20 or the like. The mass data storage 2080 may store information related to users of the client application 1100 that facilitate completion of a user transaction application, including, for instance, user profile information, records of past interactions, payment instrument information, demographic information, product or service feature preference information, or the like.

25 As illustrated, the computer system 2000 is general-purpose computing machinery. As one of skill recognizes, programmed instructions may configure general purpose computing machinery to embody structures capable of performing functions in accordance with aspects of the invention. Special purpose computing

APPENDIX A (continued)

machinery comprising, for example, an application specific integrated circuit (ASIC) may also be used. Further, configurable hardware could be used including, for instance, a field programmable gate array or a complex programmable logic device. One skilled in the art will recognize, numerous structures of programmed or programmable logic capable of being configured to embody aspects of the invention. In some embodiments, the computer system 2000 is a SPARC-based workstation from Sun Microsystems of Mountain View, CA, running the SOLARIS operating system and the Apache HTTP server with a Secure Sockets Layer module. In such embodiments, the sever process 1300 could comprise the Apache HTTP server with the Secure Sockets Layer module.

Frequently the client application 1100 communicates with the sever process 1300 to carry out a user transaction application. The user transaction application may be a commercial transaction (sometimes referred to as "E-Commerce"), although one skilled in the art is familiar with many other user transaction applications conventionally practiced in, for instance the Internet environment. Frequently, user transaction applications are implemented with "forms." The HTML specification (version 3.2, the proposed version 4.0, and it is likely later-developed versions available from the World Wide Web Consortium at <<http://www.w3c.org>> or through the MIT Laboratory for Computer Science in Cambridge, Massachusetts) has particular provisions for forms that are conventionally used for transactions, although many other conventional Internet programming techniques are also used for forms-based user transaction applications.

Fig. A3 depicts a diagram of a conventional user transaction application using form pages. The client application 1100 sends a user transaction application initiation request 3400 to the sever process 1300 to initiate the user transaction application. The user transaction application initiation request 3400 may be a Request Message in accordance with the HTTP specification which comprises a Uniform Resource Identifier ("URI") that corresponds to a resource available on the sever process 1300

APPENDIX A (continued)

which initiates execution of the user transaction application. Forms are typically used in user transaction applications to receive input from the user that is necessary to complete the user transaction application. A form comprises one or more form fields; the user provides form field values for the one or more form fields. With reference to
5 Fig. A3, a first form page 3450 is communicated from the sever process 1300 to the client application 1100 which renders the form page. The client application 1100 then receives user input for the form field values and communicates first form page field values 3500 to the sever process 1300.

Frequently, and particularly when the client application 1100 renders on a
10 display with limited resolution (compared to a PC) such as a television, forms for completion of the user transaction application span multiple pages. This is depicted in Fig. A3 where the sever process 1300 communicates a second form page 3550 to the client application 1100 which responds with a second form page field values 3600 after the user has entered the appropriate form field values. This process may
15 continue for several iterations, and a Nth form page 3650 and a Nth form page field values 3700 are depicted for some integer 'N' greater than 2. For PC-oriented forms, N rarely exceeds 5. However, as noted above, when completion of user transaction applications requires several form pages, server resources may become burdened and user frustration may increase, perhaps reducing the likelihood the user will engage in
20 subsequent transactions with the operator of the sever process 1300. Accordingly it is desirable that, when possible, form pages for completion of user transaction application should be suppressed.

Fig. A4 depicts a flow diagram of an 'automatic page suppression' method
4000 in accordance with an illustrative embodiment. The 'automatic page
25 suppression' method 4000 is carried on by a server process configured for operation with a dynamic contents document, for instance one that contains application logic that describes how to process a request to generate a response. Several conventional dynamic document architectures are known in the art including, for instance, Sun

APPENDIX A (continued)

Microsystems' JavaServer Pages, or Microsoft Corporation's Active Server Pages. Other conventional server-side scripting architectures could also be used.

5 The 'automatic page suppression' method 4000 depicts process flow of an interaction of the dynamic contents document and the sever process 1300 in handling a user transaction application initiated from the client application 1100. Process flow initiates at a 'start' terminal 4050 and continues to receive a 'request' data block 4100 corresponding to an indication from the user of the client application of initiation of the user transaction application. The sever process 1300 retrieves a resource
10 corresponding to the request. In this illustrative embodiment, the resource is a JavaServer Page type dynamic contents document. The server process begins processing the application logic of the dynamic contents document.

One aspect of the application logic is to maintain state information from a first portion of the user transaction application so that it is available to later portions of the user transaction application. For instance, if the user transaction application
15 comprises several pages in which user information input is received, the user information input from the first of the several pages should be maintained for completion of the user transaction application. A 'state object setup' process 4150 executes in which the sever process creates a state object for maintaining state information across plural portions of the user transaction application. When
20 JavaServer Page type dynamic contents documents are used, the state object may be a JAVA Bean. Other state objects could be used depending on the server process architecture, either more sophisticated programatically, or less sophisticated, for instance a temporary file.

Process flow continues to a 'page suppression mode' decision process 4200
25 that determines if the user transaction application should execute in page suppression mode. A selectable option may be provided for determining whether the user transaction application should execute in page suppression mode. Preferably, when

APPENDIX A (continued)

the selectable option is selected the user transaction application executes with page suppression. In some embodiments, the selectable option is provided to an operator of the server process. In other embodiments, the selectable option is provided to the user of the client application. In this instance, the user selects whether to complete the user transaction application with page suppression and the user's selection is transmitted to the server process. A preliminary page in the user transaction application could provide the selectable option to the user; the selectable option could be a user interface element, for instance, a button, a check box, etc. In still other embodiments, the selectable option could be a field in a profile for the user and the server process could examine this field to determine whether the user transaction application should execute in page suppression mode.

The 'page suppression mode' decision process 4200 is a method executed by the server process in processing the application logic of the dynamic contents document. If the user transaction application should execute in page suppression mode, the 'page suppression mode' decision process 4200 exits through its 'yes' branch. In this illustrative embodiment, the dynamic contents document defines a set of form fields required for completion of the user transaction application. The dynamic contents document further comprises a method invocation for determining whether sufficient form field values are available for the set of form fields so that suppression of the page(s) soliciting user input of the form field values may be suppressed.

When processing the dynamic contents document, the server processes invokes this method and its execution initiates. Process flow continues to a 'required field selection' process 4300. The 'required field selection' process 4300 selects one of the set of form fields that are required to complete the user transaction application (mnemonically "F"). A user transaction application may have fields that are not required to complete the user transaction application. Preferably the dynamic contents document comprises a set of form fields that are required to complete that portion of

APPENDIX A (continued)

the user transaction application associated with the dynamic contents document and the 'required field selection' process 4300 selects from that set. No particular manner of selection is fundamental, iteration through a list is typically sufficient. Process flow continues to a 'sufficient field value' decision process 4400.

- 5 The 'sufficient field value' decision process 4400 determines if a sufficient form field value exists for the one of set of form fields to complete the user transaction application. The user of the client application submitting the 'request' data block 4100 may have user profile information accessible to the server process that can be accessed to provide the form field value for the one of the set of form
- 10 fields. Commonly, the user of the client application is queried to provide user identification information, e.g., a user ID and password, at the initiation of a session of which the user transaction application is a part. If this is the case, the user identification information can be used to access the user profile information which can then be examined for the form field value, e.g., a shipping address or postal code for
- 15 the user, payment instrument information, product size, color, or configuration preferences, etc. In other instances, user profile information is not stored; however, records of previous interactions during the same session could be kept and used for the form field value. For instance, during a first user transaction application a user could purchase a first item; the server process could be configured to store a record of
- 20 this interaction for the duration of the user's session. Were the user to initiate a second user transaction application to purchase a second item, the stored record of the previous interaction could be accessed by the server for the form field value. Still, further, client-side state objects could also be used for storing the form field value and the client-side state object could be queried from the server process. In addition, a
- 25 third party information manager (sometimes referred to as an "infomediary") could store the user information and the sever process 1300 could query the third party information manager.

APPENDIX A (continued)

In some embodiments, the determination made by the 'sufficient field value' decision process 4400 as to whether a sufficient form field value is available is context insensitive. For instance, the 'sufficient field value' decision process 4400 may simply determine if there is a non-NULL value for the form field value, and, if so, deem that sufficient information is available with respect to the one of the set of form fields. In other embodiments, the 'sufficient field value' decision process 4400 could perform more complex context-sensitive determinations. Still further, form field value validation logic could also be performed. For instance, a postal code could be verified for an appropriate number of digits, an email address could be examined for compliance with the relevant specifications, a domain name could be resolved to determine if it corresponds to a reachable host, etc.

If the 'sufficient field value' decision process 4400 determines a sufficient form field value is available for the one of the set of form fields, it exits through its 'yes' branch and process flow continues to an 'additional required fields' decision process 4500. If the 'sufficient field value' decision process 4400 determines that a sufficient form field value is not available, it exits through its 'no' branch. In this instance, the server process completes execution of the invoked method and continues to a 'provide page' process 4700 to provide the dynamic contents document to the client application for receiving the form field value.

When the 'sufficient field value' decision process 4400 exits through its 'yes' branch, process flow continues within the invoked method to the 'additional required fields' decision process 4500. While members of the set of form fields that are required for completion remain for which the determination has not been made that a sufficient form field value is available, the 'additional required fields' decision process 4500 exits through its 'yes' branch and process flow returns to the 'required field selection' process 4300 for another iteration. When the 'additional required fields' decision process 4500 exits through its 'no' branch, process flow continues to a 'redirection to successor page' process 4600. The 'additional required fields' decision

APPENDIX A (continued)

process 4500 exits through its 'no' branch only when each of the set of form fields required for completion has been examined and it has been determined that a sufficient form field value is available. That is, the page that would have been provided by the 'provide page' process 4700 did not need to be provided to receive user input of one or more of the form field values: provision of the page has been suppressed.

The 'redirection to successor page' process 4600 is performed by the invoked method and returns a response to the request received in the 'request' data block 4100 that redirects the request to a next page in the user transaction application. As one of skill in the art will appreciate, the redirection may be either entirely internal to the server process, or the client application may be provided with the response and the client application would then submit a next request to the next page. Preferred embodiments employ internal server redirection, however this is not fundamental.

In some embodiments, the 'redirection to successor page' process 4600 appends the set of form fields and their corresponding form field values onto the request when redirecting the request to the next page. This allows information received or retrieved when processing a current page to be made available when processing the next page. Still further, in some applications simply redirecting to the next page's URI circumvents processing of the form values desirable for successful completion of the user transaction application. For instance, processing of a shipping address and postal code could be used to determine, for instance, product sales tax and calculation of the latter could be triggered by the "posting" of the former from its form page. Such applications preferably redirect to the next page's URI while including a query string comprising all required form field/value pairs, this function may be performed by including a formatted query string comprising the set of form fields and their corresponding form field values. From the 'redirection to successor page' process 4600 or the 'provide page' process 4700, process flow completes through an 'end' terminal 4800.

APPENDIX A (continued)**JUST IN TIME PAGINATION**

In the above-described illustrative embodiment, user information requests were provided though a plurality of ordered pages of predetermined length. However, it is not fundamental that the user transaction application be split across the plurality of ordered pages, or that pages be of a predetermined length. Rather, pagination may occur responsive to the number and type of the set of form fields for which sufficient information is not available. To further illustrate this aspect, Fig. A5 depicts a flow diagram of a 'just in time automatic page suppression' method 5000 in accordance with an illustrative embodiment. The 'just in time automatic page suppression' method 5000 is similar to the 'automatic page suppression' method 4000 in that it involves the interaction of a server process with a dynamic contents document and shares several steps for performing analogous functions.

Process flow initiates at a 'start' terminal 5005 and continues to receive a 'request' data block 5010 corresponding to an indication from the user of the client application of initiation of the user transaction application. The server process retrieves a resource corresponding to the request. In this illustrative embodiment, the resource is a JavaServer Page type dynamic contents document. The server process begins processing the dynamic contents document. Process flow continues to a 'state object setup' process 5020 that creates a state object for maintaining state information across plural portions of the user transaction application. Next, a 'required field selection' process 5040 executes analogously to the 'required field selection' process 4300 described above. Process flow continues to a 'sufficient field value' decision process 5050 that performs functions similar to both the 'page suppression mode' decision process 4200 and the 'sufficient field value' decision process 4400 of Fig. A4.

Just in time pagination effectively provides field suppression on a field-by-field basis and there need not be predetermined pages at all. However, the user or the

APPENDIX A (continued)

operator of the server process may desire to provide all required form fields to the user. For instance, the user may desire to verify or re-enter previously entered form field values. Thus, the features of the 'page suppression mode' decision process 4200 could also be beneficially used with just in time pagination.

5 A selectable option could be provided to the user or the server process operator as described above in connection with the 'page suppression mode' decision process 4200. With just in time pagination, preferred embodiments provide all required form fields (with any available form field values filled in for review and editing by the user) if page suppression mode is not selected. The 'sufficient field value' decision
10 process 5050 examines whether page suppression mode has been selected with the selectable option.

 If page suppression mode is not selected, the 'sufficient field value' decision process 5050 treats all of the set of form fields as lacking a sufficient form field value and exits through its 'no' branch. When page suppression is selected, the 'sufficient
15 field value' decision process 5050 executes analogously to the 'sufficient field value' decision process 4400 of Fig. A4. That is, it exits through its 'no' branch if, and only if, it determines a sufficient form field value is unavailable.

 When, the 'sufficient field value' decision process 5050 exits through its 'no' branch the one of the set of form fields ("F") should be added to a page that will be
20 provided to the user for receiving the form field value. When page suppression is not selected, this occurs for each of the set of form fields.

 Typically plural form fields may be suitably arranged on a single page. In this illustrative embodiment, the separation of the form fields from the set of form fields for which form field values are required into an appropriate number of pages occurs
25 when the determination is made that a sufficient form field value is not available. The pagination is just in time. In this instance, just in time pagination is accomplished by creating a developing page for a first form field. Additional form fields are added to

APPENDIX A (continued)

the developing page until it is determined that the developing page should be provided to the user to receive user input. If additional form fields require user input a next developing page is created and additional form fields added to it until it is determined that the next developing page should be provided to the user to receive user input.

- 5 This process can continue until there are no remaining form fields for which user input is required. When the 'sufficient field value' decision process 5050 exits through its 'no' branch, an 'add F to developing page' process 5070 adds the form field to the developing page.

- 10 Depending, for instance, on the client application, the number and nature of the set of form fields that are appropriate for a single page may vary. For example, if the client application is a platform integrating television reception and, for instance an HTTP, client, such as a conventional set-top box, then a user's display is likely a conventional television. If the user's display is a conventional television suitable screen area for the page is more limited than if the user's display were a conventional display use with a personal computer or workstation. For instance, suitable screen area of a conventional television may be 544 (width) by 300 (height) pixels. While a single page, when rendered, could exceed this, it may be desirable that a single page fit within the suitable screen area so that the user is not inconvenienced by having to scroll or navigate across multiple screens of the page.

- 20 From the 'add F to developing page' process 5070 and when the 'sufficient field value' decision process 5050 exits through its 'yes' branch indicating a sufficient form field value is available, process flow continues to a 'developing page to user' decision process 5060. The 'developing page to user' decision process 5060 tests two conditions; if either of the conditions are true, the developing page should be provided to the user for data input.

The first test condition is whether the developing page is full. A conventional two-dimensional bin packing algorithm may be used for this test, as may simpler

APPENDIX A (continued)

heuristics. If a bin packing algorithm is used, the suitable screen area may be obtained, for instance from a predetermined value used by the server process, or responsive to an inference based on the type of client application. For example, an inference could be made that if the client application is a set-top box, the suitable
5 screen area is that of a television screen. The screen area (in pixels) of a form field along with any previous form fields added to the developing page could be used by the bin packing algorithm to determine if another of the form fields can be added to the developing page. If another form field cannot be added, the developing page is full and the first test condition is true. The second test condition is whether the
10 developing page should be provided even if it is not full. This situation occurs when at least one of the set of form fields has been added to the developing page--but the developing page is not full--and there are no additional required fields. In this instance, the page should be provided even though it is not full and the second test condition is true.

15 If either the first or second test condition is true, the 'developing page to user' decision process 5060 exits through its 'yes' branch and process flow continues to a 'provide page' process 5080 that provides the completed developing page to the client application for user input of the form field value. When the user input is received, process flow continues to a 'field value(s) storage' process 5090 that stores the form
20 field value received from the user. In some embodiments, the 'field value(s) storage' process 5090 stores the form field value in the state object created by the 'state object setup' process 5020; in other embodiments, the 'field value(s) storage' process 5090 stores the form field value along with the set of form fields as field/value pairs in a string that can be later passed as a query string portion of a URI as previously
25 described.

As described above, testing of whether the developing page was full occurred after a field was added to the developing page. This is suitable in situations where

APPENDIX A (continued)

form fields are of nearly constant space, e.g. input boxes and drop-down menus. As most user transaction applications are of this type, the post-testing is suitable. In instances where the expected form fields are not of nearly constant space, a pre-addition test could be used and when the developing page was full, a next page
5 started, the form field provided to the next page, and the developing page be provided to the user.

From the 'field value(s) storage' process 5090 and when the 'developing page to user' decision process 5060 exits through its 'no' branch indicating both the first and second test conditions are false, process flow continues to the 'additional required
10 fields' decision process 5100. The 'additional required fields' decision process 5100 performs analogously to the 'additional required fields' decision process 4500 which was previously described. While members of the set of form fields remain for which the determination has not been made that a sufficient form field value is available, the 'additional required fields' decision process 5100 exits through its 'yes' branch and
15 process flow returns to the 'required field selection' process 5040 for another iteration. When the 'additional required fields' decision process 5100 exits through its 'no' branch, process flow continues to a 'redirection to successor page' process 5130.

The 'redirection to successor page' process 5130 redirects the request received
20 in the 'request' data block 5010 to the successor page in the user transaction application, which, when just in time pagination is employed, is typically a page that informs the user that the user transaction application has been completed. As described above in connection with the 'redirection to successor page' process 4600, the redirected request may comprise a query string with field/value pairs. Process
25 flow then completes through an 'end' terminal 5150.

Although the present invention has been described in terms of features illustrative embodiments, one skilled in the art will understand that various

APPENDIX A (continued)

modifications and alterations may be made without departing from the scope of the invention. Accordingly, the scope of the invention is not to be limited to the particular embodiments discussed herein, but should be defined only by the allowed claims and equivalents thereof.

5

Claims

What is claimed is:

1. A computer-implemented method for deferring completion of a multi-step user transaction application ("MUTA"), said computer-implemented method comprising:
 - 5 providing a page to a client application, said page comprising
 - one or more resources for input of information related to completion of said MUTA; and
 - a resource for selection of a deferral action;
 - 10 receiving an indication of the selection of said deferral action;
 - storing state information comprising:
 - a position in said MUTA; and
 - information related to completion of said MUTA; and
 - 15 generating a resumption object comprising an identifier of a resource for completion of said MUTA.
2. The computer-implemented method according to claim 1 wherein said step of storing state information is performed at plural steps in said MUTA.
3. The computer-implemented method according to claim 2 wherein storing state information comprises:
 - 20 monitoring an elapsed time since a transaction page was provided;
 - determining whether said elapsed time exceeds a predetermined time limit;
 - and
 - storing state information if a user response is received within said predetermined time limit.

4. The computer-implemented method according to claim 1 further comprising:

transmitting said resumption object to a client application.

5. An apparatus comprising a processor, a storage, and an input-output system, said apparatus configured for deferring completion of a multi-step user transaction application ("MUTA"), said apparatus comprising:

server process logic configured for:

- providing a page to a client application, said page comprising one or more resources for input of information related to completion of said MUTA, and a resource for selection of a deferral action, receiving an indication of the selection of said deferral action, and generating a resumption object comprising an identifier of a resource for completion of said MUTA; and

a data storage system configured for storing state information comprising:

- a position in said MUTA, and information related to completion of said MUTA.

6. The apparatus of claim 5 wherein said server process logic is configured for storing state information in said data storage system at plural steps in said MUTA.

7. The apparatus of claim 6 further comprising process logic configured for monitoring an elapsed time since a transaction page was provided.

8. The apparatus of claim 5 wherein said server process logic is further configured for transmitting said resumption object to a client application.

9. A computer program product comprising a computer readable storage medium having computer readable code embodied therein for deferring completion of a multi-step user transaction application, said computer readable code comprising:

- code for providing a page to a client application, said page comprising
- one or more resources for input of information related to completion of said MUTA; and
- a resource for selection of a deferral action;
- 5 code for receiving an indication of the selection of said deferral action;
- code for storing state information comprising:
- a position in said MUTA; and
- information related to completion of said MUTA; and
- code for generating a resumption object comprising an identifier of a resource
- 10 for completion of said MUTA.
10. The computer program product according to claim 9 wherein said code for storing state information comprises:
- code for storing state information at plural steps in said MUTA.
11. The computer program product according to claim 10 wherein said code for
- 15 storing state information comprises:
- code for monitoring an elapsed time since a transaction page was provided;
- code for determining whether said elapsed time exceeds a predetermined time limit; and
- code for storing state information if a user response is received within said
- 20 predetermined time limit.
12. A computer-implemented method for completing a previously-deferred MUTA, said computer-implemented method comprising:
- providing a resumption object to a client application, said resumption object comprising an identifier of a resource for completion of said MUTA;

receiving a request for said resource for completion of said MUTA
retrieving previously-received information for returning to a state at which
said MUTA was previously deferred; and
providing a resource corresponding to said state at which said MUTA was
previously deferred.

5

13. An apparatus comprising a processor, a storage, and an input-output system,
said apparatus configured for completing a previously-deferred MUTA, said
apparatus comprising:

a data storage system configured for storing a state object; and

10

server process logic configured to

provide a resumption object to a client application, said resumption object
comprising an identifier of a resource for completion of said MUTA;

receive a request for said resource for completion of said MUTA

retrieve previously-received information from said state object for returning to
a state at which said MUTA was previously deferred; and

15

provide a resource corresponding to said state at which said MUTA was
previously deferred.

14. A computer program product comprising a computer readable storage medium
having computer readable code embodied therein for completing a previously-
deferred MUTA, said computer readable code comprising:

20

code for providing a resumption object to a client application, said resumption
object comprising an identifier of a resource for completion of said MUTA;

code for receiving a request for said resource for completion of said MUTA

code for retrieving previously-received information for returning to a state at
which said MUTA was previously deferred; and

25

code for providing a resource corresponding to said state at which said MUTA

was previously deferred.

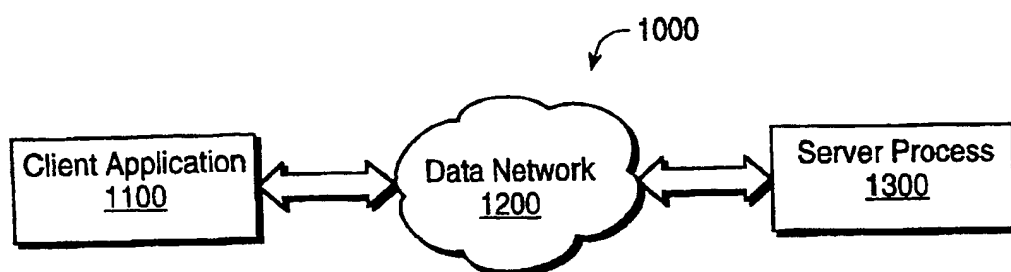
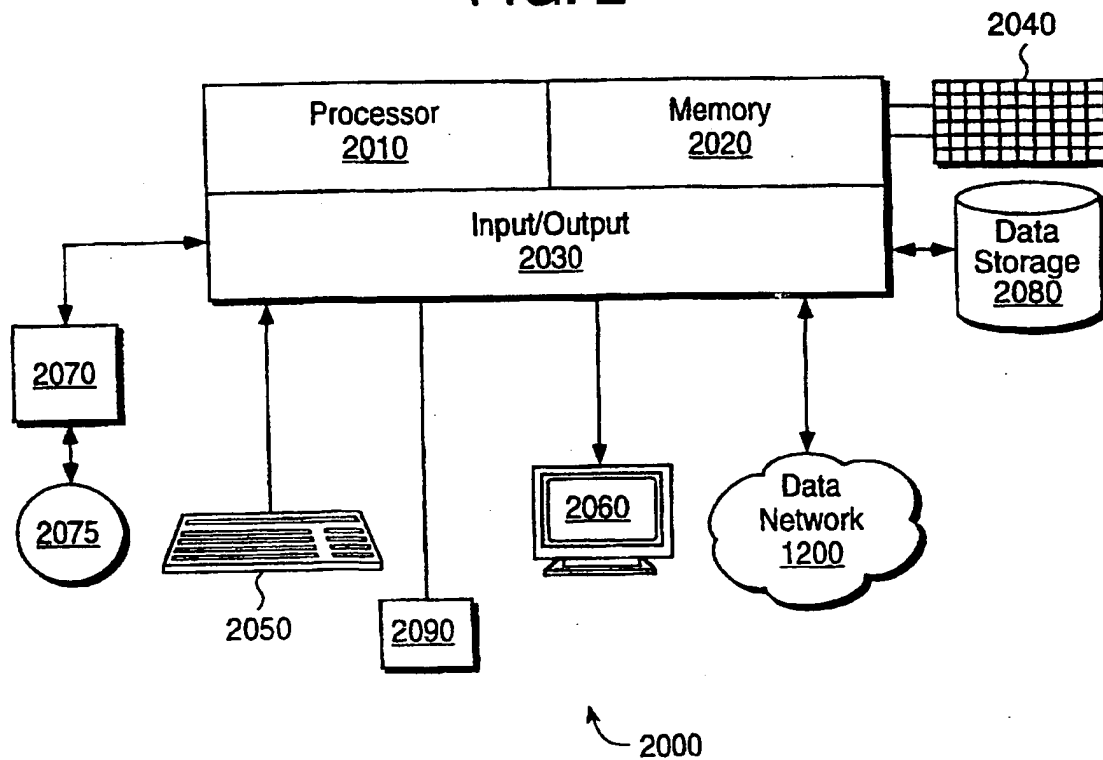


FIG. 1

FIG. 2



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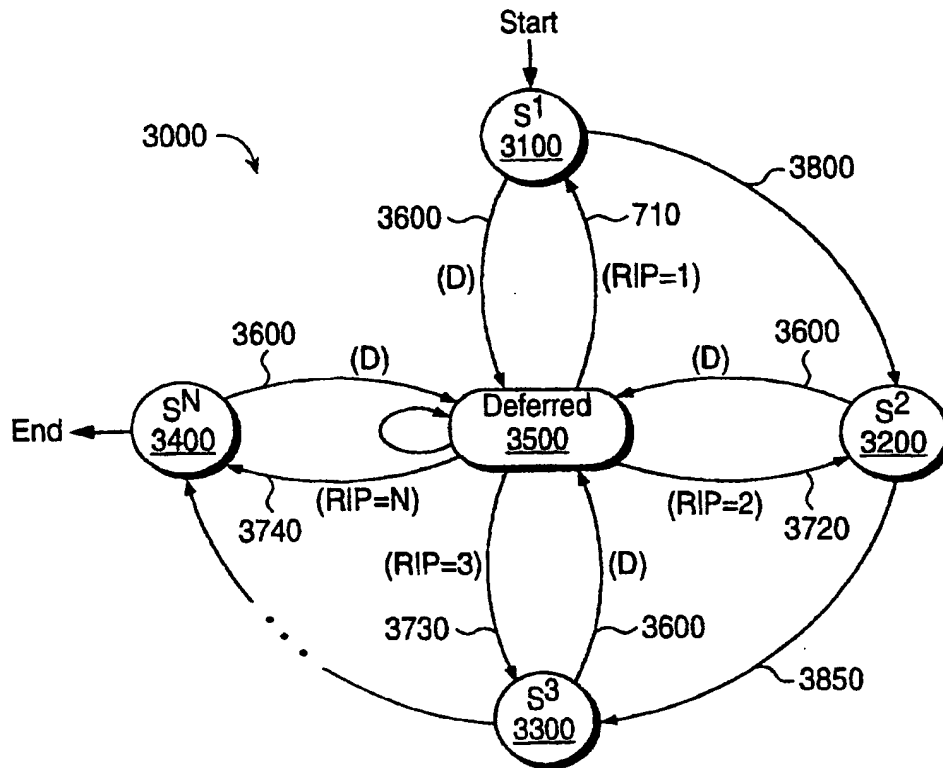


FIG. 3

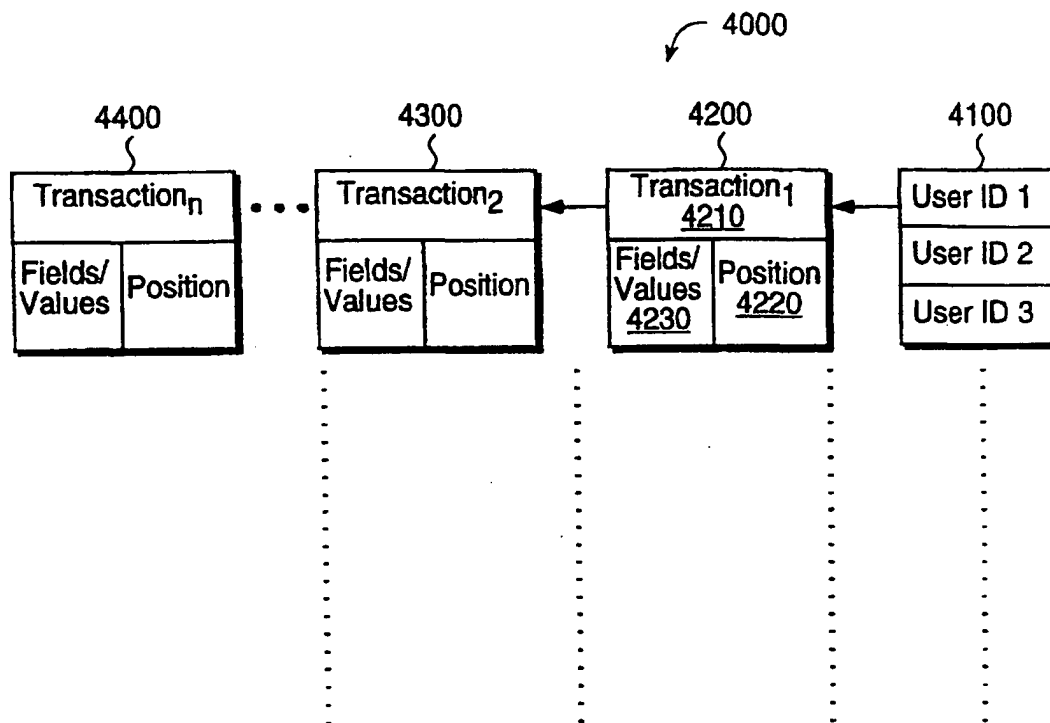
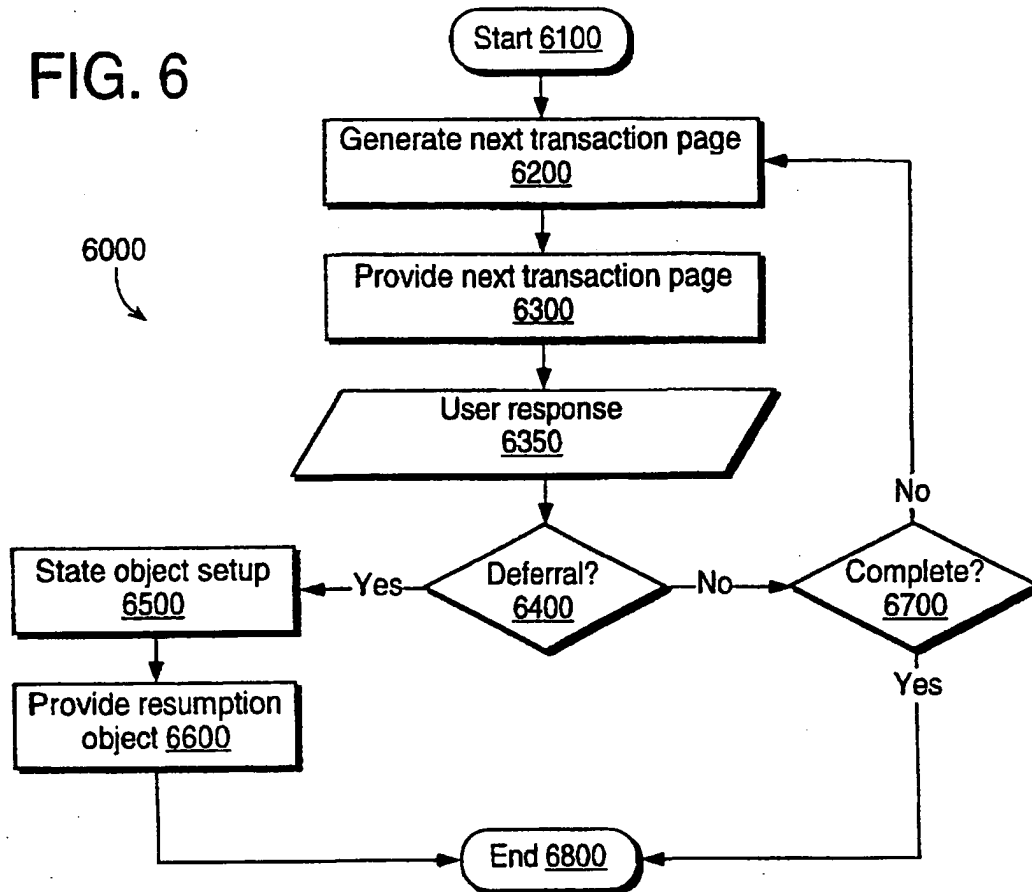


FIG. 4

Shipment Address	<input type="text" value="5100"/>
Shipment Postal Code	<input type="text" value="5200"/>
Shipment Method	<div><input type="radio"/> Overnight Delivery <input type="radio"/> 2-Day Delivery <input type="radio"/> Standard Delivery</div>
	<div>5300</div>
	<div>5400</div>
<input type="button" value="Submit"/>	<input type="button" value="Clear"/>
	<input type="button" value="Defer"/>

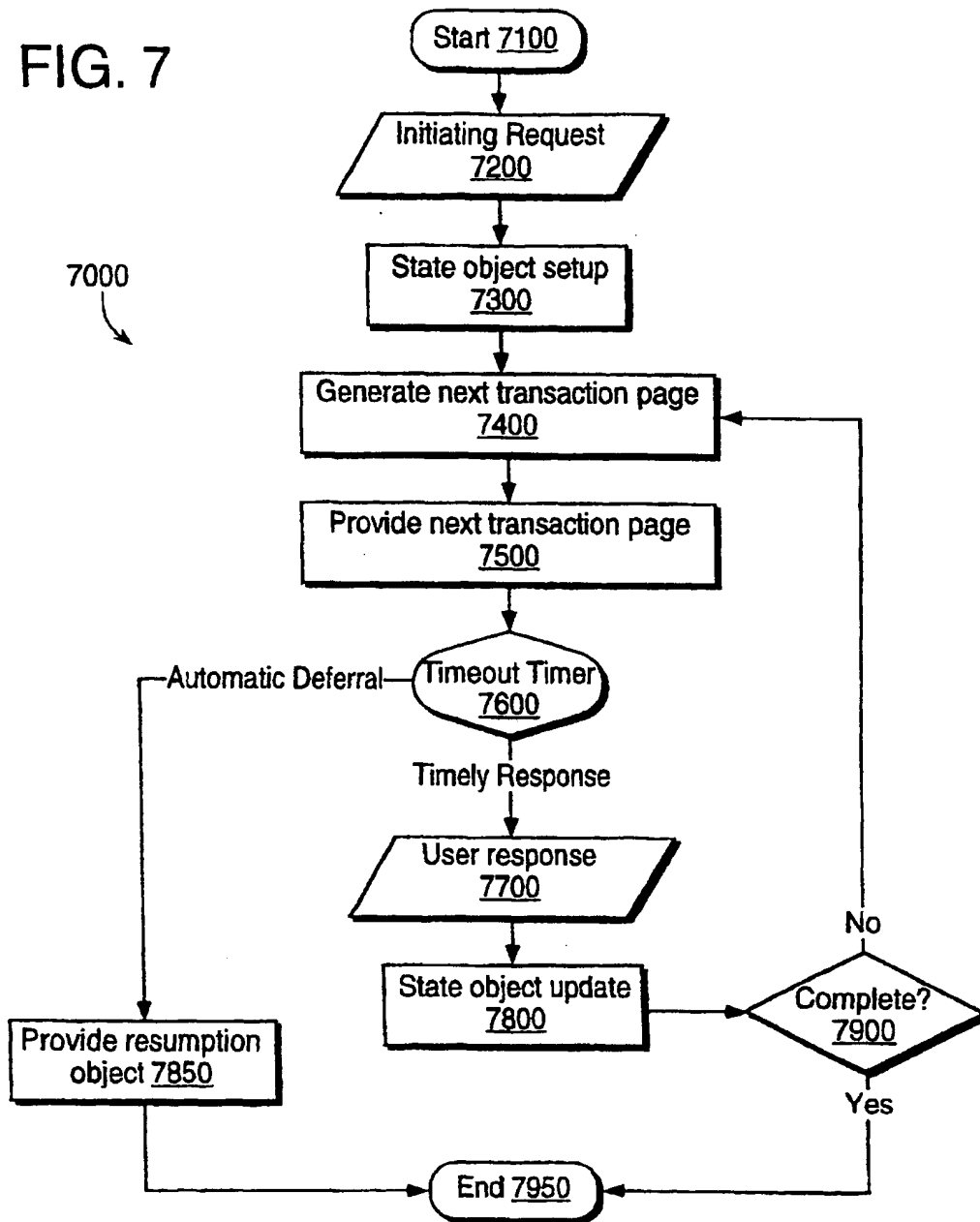
FIG. 5

FIG. 6



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FIG. 7



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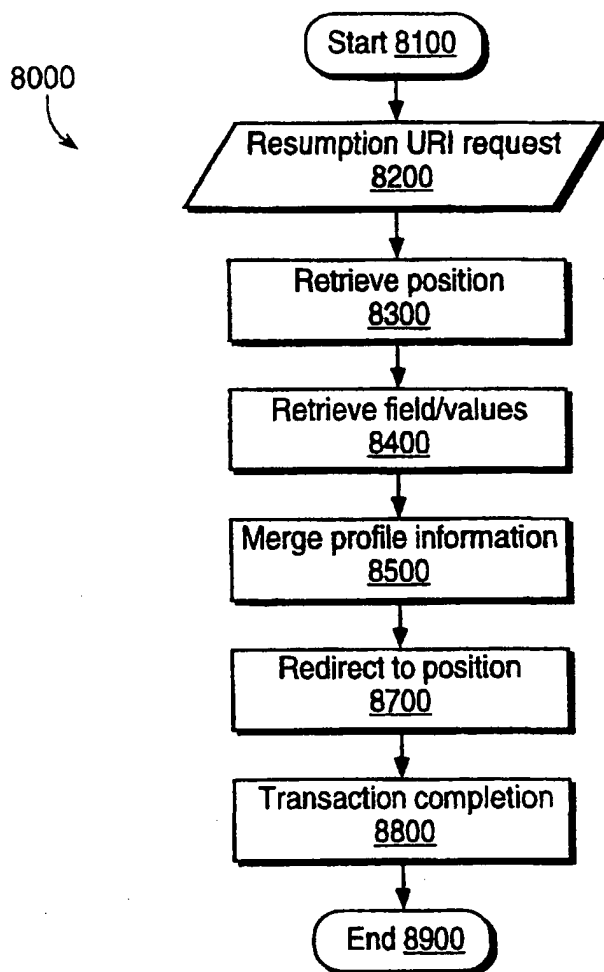


FIG. 8

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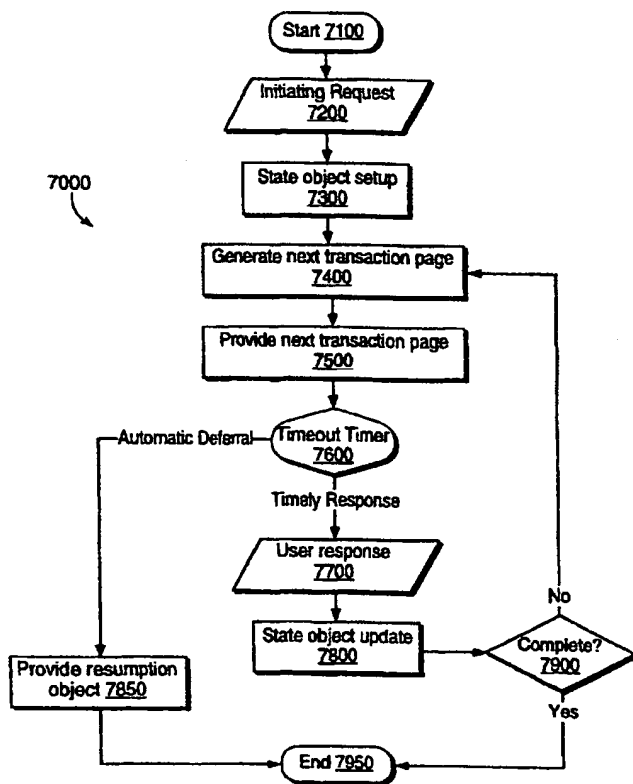
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[Continued on next page]

(54) Title: METHOD, APPARATUS, AND COMPUTER PROGRAM PRODUCT FOR DEFERRED COMPLETION OF MULTI-STEP USER TRANSACTION APPLICATIONS



(57) Abstract: Disclosed are server features for allowing a client user to defer completion of multi-step user transaction applications ("MUTAs") and later resume the MUTA. One disclosed feature is providing a selectable deferral action in a page implementing part of the MUTA, e.g., HTML, XML, JavaScript/ECMA Script document. If the client user selects to defer completion, a state object is created by the server and stores state information including information previously entered during the MUTA. The server provides a resumption object to the user including a resource for resuming the deferred MUTA. When the user selects the resource, state information stored in the state object is loaded and the user may complete the remainder of the MUTA. An additionally disclosed aspect is automatic state saving where state information is stored automatically during multiple steps in the MUTA; the user then need not select deferral.



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INTERNATIONAL SEARCH REPORT

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

IBM-TDB, WPI Data, EPO-Internal, INSPEC, PAJ

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A	page 1042, left-hand column, line 26 - line 46 page 1044, right-hand column, line 43 -page 1047, left-hand column, line 40 page 1048, right-hand column, last line -page 1050, left-hand column, line 4 --- -/--	3,7,11

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	WO 99 23558 A (ORACLE CORP) 14 May 1999 (1999-05-14) abstract column 3, line 29 -column 4, line 10 figures 7C,7F-7I -----	1-14

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INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

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Form PCT/ISA/210 (patent family annex) (July 1992)

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